



STATUS OF ELECTRIC VEHICLES IN INDIA

Tanya Bhatia¹, Nidhi Arora², Shreya Sharma³

¹Assistant Professor in Delhi University

²Assistant Professor Faculty of Arts, Parul University, Gujarat

³Research Scholar

ABSTRACT

The automobile industry has shifted to electrically driven vehicles as a result of the harm that gasoline engines do to the environment and to humans. This document discusses explains how an electric car operates and contrasts it with hybrid vehicles and internal combustion engines. The document outlines a few of the benefits and drawbacks of the electric car. A brief look into the technology's future is also provided. The electric vehicles market in India appears to be going traction. Companies have not only started to manufacture electric scooters and bikes in states like Uttar Pradesh, but have also begun to research for alternatives to lithium-ion batteries, which are mostly imported from China. Recently, EV major Tesla has announced that they are going to start its India operation soon.

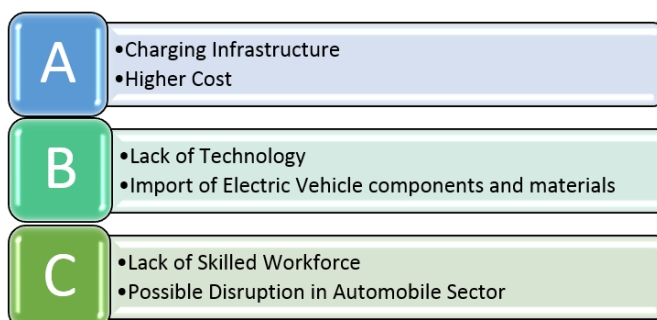
Vehicle ownership is increasing rapidly in our country. In 2001, 57 people out of 1000 were a car owner and today this number has reached 197 and mostly there were fossil-fuel vehicles. India is the 5th largest manufacturer of cars in the world. So, we can see that a lot of potentials is present here if fossil fuel vehicles are to be replaced. And the Indian government has also set a goal for the year 2030 to replace 80% of two and three-wheelers, 40% of buses, and 30 to 70% of cars in India, says the NITI Aayog. As the nation gears towards its 'Zero-emission' 2070 dream, funds and focus are directed towards electric mobility. And this aim has a very big monetary value. By 2030, more than 100 million people would buy an EV having a monetary value of more than 200 billion USD. India annually imports around Rs.8 lakh crore worth of crude oil. This is expected to double in the next 4-5 years. Fossil fuels are a non-renewable energy source and are getting depleted at a high rate. While at it, they are also depleting the environment. From choking air quality to extreme weather conditions, we have been bearing the brunt of our extensive dependency on fossil fuel. To battle climate change, India too has been focusing on alternative and efficient energy sources, like its global counterparts.

In March 2022, Minister for Road Transport and Highways, Nitin Gadkari mentioned in the Parliament that between 2019-20 and 2020-21, the two-wheeler EVs rose by 422%, three-wheelers by 75% and four-wheelers up by 230%. The number of electric buses also increased by over 1200%.

So, the target set for 2030 looks very ambitious. But the government cannot do everything, you and the brands would have to work for this. The Indian Government wants Tesla to set up the factories here, manufacture the cars here and then sell but Elon Musk wants to sell cars by importing them from other countries. The government even proposed Tesla of importing only parts of the car and assembling them here. But Elon Musk is unturned. He wants to sell readymade cars in India. And on this, the Indian government is collecting huge duty. This is a reason for conflict between the two. So, this way the story of a foreign brand that wants to run its business here but is struck in taxes. Now, Tesla is a foreign brand, what are the Indian brands doing? The first Indian name for EVs is OLA Electric which is setting up a future factory in Tamil Nadu. This factory would have more than 3000 robots, a forest larger than 500 acres, this would be a carbon-negative factory which would be the most sustainable one and this would be the largest two-wheeler factory in the world. They claim that this factory would manufacture more than 10000 vehicles every year. And recently they have earned funding of 100 million dollars for this project. So, we were used to their cabs but now people would use their scooters. Apart from OLA Electric other brands are also emerging. Athar Energy is one among them which is getting very popular in the two-wheeler EV segment. Along with these Hero, Revolt motors, Magenta EV have also got funding of 15-30 million dollars and if we look at 3 wheelers and 4 wheelers then Hyundai, Mahindra, Ashok Leyland have also got funding of 200-400 Million USD. So, by looking at all this we can say that there is huge hustle and bustle in the internal market. Huge investments are being made and every brand is ramping up themselves with respect to EVs.

CHALLENGES FACED BY INDIAN MARKETS

While these numbers are promising, India's road to a fully electric ecosystem still has a few hurdles- High cost, inadequate infrastructure, lack of high performing EVs.



HIGHER COST: The electric variants of the 2 and 4 wheelers are often priced much higher than regular fuel options. This is the most important reason for the slow adoption of electric mobility. Over 60% of consumers believe that an EV is beyond their budget. Both the upfront and maintenance costs burn a hole in the customer's pockets. The maintenance costs are high mainly due to the lack of necessary amenities. For example, the Tata Nexon price starts from Rs. 7.19 lakh, while the Tata Nexon EV price starts from Rs. 13.99 lakh. This huge price difference discourages many interested EV buyers to shy away from making the final decision to buy a BEV.

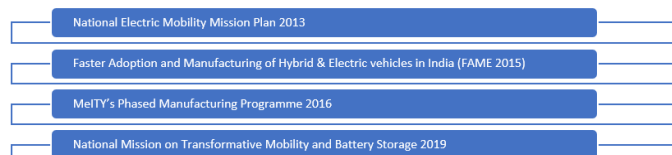
CHARGING INFRASTRUCTURE: There are more than 65,000 petrol pumps in India but only 1640 EV charging stations. Most EV owners resort to charging their vehicles at their homes. This too becomes a challenge if there is a power crisis and if parking space is shared.

IMPORT OF ELECTRIC VEHICLE COMPONENTS: The lithium-ion battery is the most popular and widely used energy source for EVs. India doesn't produce lithium. The country doesn't produce li-ion batteries either. India relies on import for EV batteries resulting in the sky-high price for those important components and eventually the EVs as well.

LACK OF OPTIONS: There are hundreds of options if one wants to buy conventional fuel powered car or two-wheeler. The case is completely different in EV segment. Only a few options are there and majority among them are not from established trustworthy brands. This drives the customers away from buying EVs.

In the year 2019, the Indian government approved the FAME II scheme, in which the government has proposed to invest about USD 1.4 billion to incentivize the production of electric vehicles in the country. However, FAME II policy also requires 50% localization in vehicle production is required to avail this benefit. The Indian Government took an attempt to promote electric mobility in the country via incentivizing and discounts for EVs. The terms and conditions of the FAME scheme doesn't support a majority of the electric vehicles. The low-speed electric two-wheelers, lead-acid battery powered EVs are not covered under FAME. The highly expensive high-speed EVs on the other hand require registration charge, driving license. This results in many customers shying away from buying EVs. Therefore, most firms will not be able to enjoy the benefits of the FAME II incentive, which consequently impacts the growth of business opportunities.

WHAT ARE WE DOING?



The EVs in India so far have only been variants of the already available fossil-fuel driven 2 and 4 wheelers. High performing luxury variants or supercars like the Tesla are yet to hit the Indian markets. Hoping to convert more consumers into Electric Vehicle owners, the government is offering subsidies for purchasing electric vehicles. A tax exemption of Rs. 1.5 lakh is also given for people buying electric cars on loan. The GST for the purchase of EVs is set at just 5% with zero cess.

Also, under two phases of the FAME or faster adoption and manufacturing of hybrid and electric vehicles scheme, the government has been trying to improve the infrastructure for electric vehicle manufacturing in the country. There is also a plan for 22,000 EV charging stations to be set up by Oil Marketing Companies across the country.

WHAT HAS HAPPENED?

Over the last few days, there have been at least four reported incidents of two-wheeler electric vehicles – made by the likes of Ola, Okinawa and Pure EV abruptly bursting into flames, bringing to the fore safety issues related to such vehicles, especially the batteries that power them. EVs are powered by lithium-ion batteries, of the kind used in cellphones and smartwatches, which are generally considered to be efficient and light compared to their counterparts. However, they may also pose a fire risk, as evidenced by the recent incidents.

ABOUT LITHIUM-ION BATTERIES

From electric cars to smartphones to laptops, lithium-ion (Li-ion) batteries are the most popular battery type today, powering millions of consumer electronics around the world. A Li-ion battery consists of an anode, cathode, separator, electrolyte, and two current collectors. The anode and cathode are where the lithium is stored, while the electrolyte carries positively charged lithium ions from the anode to the cathode and vice versa through the separator. The movement of the lithium ions creates free electrons in the anode, which creates a charge at the positive current collector.

The key things that make a Li-ion battery better than other kinds, and more suited for things like electric cars and smart phones are its light weight, high energy density, and ability to recharge. Apart from this, Li-ion batteries also typically have a longer lifespan compared to a lead acid battery. A Li-ion battery can typically store 150 watts-hour per kg as compared to a lead-acid battery which stores only around 25 watts-hour per kg.

In simple terms, it means that Li-ion batteries offer more efficiency compared to other battery types while keeping the form factor of a product relatively compact, which means an electric car fitted with Li-ion batteries will have a greater driving range, and smartphones will last longer through the day.

However, one of the biggest benefits of Li-ion batteries- its high energy density can also be a potential reason behind the battery's undoing.

BATTERY MANAGEMENT SYSTEM

A BMS is basically an electronic system that is connected to all the cells in a Li-ion battery pack, which constantly measure their voltage and the current flowing through it.

A BMS is also equipped with a myriad of temperature sensors, providing it information on temperatures at different sections of the battery pack. All this data helps the BMS calculate other parameters of a battery pack, like the charging and discharging rate, battery life cycle, and efficiency.

According to industry experts, a number of reasons, such as manufacturing defects, external damage, or faults in the deployment in the BMS could result in these batteries becoming a fire risk.

On the other hand, temperature, experts pointed out, plays a tricky role in a Li-ion battery pack.

"While Li-ion batteries typically perform better in warmer temperatures, extremely high temperatures could mean the battery pack k's ambient temperature could shoot up as high as 90-100 degrees, which is when that become extremely prone to catching fire".

FOCUS AREAS

In the 2022 budget, a battery swapping policy was announced as an easier way to charge EVs. The vehicle's used battery is simply swapped with a replenished one without having to plug the vehicle into a charging point. Last year, the government also announced a Production Linked Incentive scheme for automakers, a part of which aims to boost electric vehicles manufacturing.



If all these measures are implemented effectively and efficiently, industry experts say India is likely to see a significant growth in EV market in the coming decade.

The global automobile industry is undergoing a paradigm shift at present in trying to switch to alternative/ less energy intensive options. India, too, is investing in this electric mobility shift. The burden of oil imports, rising pollution, and as well as international commitments to combat global climate change are among key factors motivating India's recent policies to speed up the transition to e-mobility.

The sale of retail electric vehicles (EV) saw a sharp three-fold jump in 2021-22 (March-April), data from the Federation of Automobile Dealers Associations (FADA) showed. In 2021-22, 4.29 lakh electric vehicles were sold, compared to only 1.34 lakh last year, and 1.68 lakh in 2019-20.

The data from FADA showed that electric two-wheelers make up the bulk of the numbers. During the financial year that just ended, 2.31 lakh electric two-wheelers were sold, compared to just 41,046 units a year ago.

Among the brands, Hero Electric Vehicles Pvt Ltd sold the most electric two-wheelers, clocking 65,303 units during the year, followed by Okinawa Autotech Pvt Ltd at 46,447 units, Ampere Vehicles Pvt Ltd at 24,648 units and Ather Energy at 19,971.

Electric passenger vehicles also saw a 257% growth in sales, albeit over a small base. During 2021-22, 17,802 units were sold, FADA said, compared to 4,984 the year before. A, major chunk of this was sold by Tata Motors, which has the Tigor and Nexon EV products in its portfolio. The company sold 15,198 units during the year, followed by MG Motor India at 2,045 units and Mahindra & Mahindra at 156 units.

During 2021-22, 1.78 lakh electric three-wheelers were sold as against 88,391 in 2020-21 and 1.41 lakh in 2019-20. While YC Electric Vehicle leads the figures, selling 17,049 units, it is followed by Saera Electric Auto Pvt Ltd at 8,475 units and Mahindra Reva Electric Vehicles Pvt Ltd at 8,037 units. Notably, FADA said that the three-wheeler market is seeing a tactical shift from internal combustion engines to electric ones as 45% of the three-wheeler market has now shifted to EVs.

REASON FOR THE GROWTH

A concerted push by the government and expanding footprint of the charging infrastructure has led to the growth in EV sales during the year. Added to this was the sustained increase in prices of automobile fuels, such as petrol and diesel. Going ahead, with services such as battery swapping, battery-as-a-services (BaaS) setting in, sales in the segment could see further growth.

CONCLUSION

The Indian automotive industry is the fifth largest in the world and is slated to be the third largest by 2030. Catering to a vast domestic market, reliance on the conventional modes of fuel intensive mobility will not be sustainable. By making the shift towards electric vehicles (EVs), India stands to benefit on many fronts: it has a relative abundance of renewable energy resources and availability of skilled manpower in the technology and manufacturing sectors. Little bit of hesitancy will be there after the recent news of bikes bursting into flames due to high temperature. Once this problem is addressed new records will further be created. As this paper has shown, electric vehicles have a number of advantages over internal combustion engines. Although far more effective and cleaner, it has drawbacks as well. It costs more, is heavier, has a shorter range before needing to be recharged. The battery of the EV is crucial to its future. Future prospects for EVs look bright if researchers can create or locate the "super battery". Each vehicle has a unique quality that sets it apart from the others as of right now. Which vehicle will be successful in the future will depend solely on time and technological advancements.